(19) Japan Patent Office (JP) (12) Patent Gazette (A)

(11) Patent Application Publication No.
Application Number: Heisei 4-233837
(43) Publication Date: August 21, 1992

(51) Int. Cl.⁵	Id. Symbol	Office Reg. No.	FI	Techn. Reg. Field
H 04 B 17/00	J	7189-5K		
H 04 B 7/08	Z	9199-5K		

Examination Request: None

No.of Inventions: 3 (total pages 4)

(21) Application No.: Heisei 2-409042
(22) Application Filed: December 28, 1990

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(54) [Title of the Invention] RECEIVER

(57) [Abstract]

[Purpose] The presence of connection between an antenna and a reception circuit is detected and an alarm signal is produced in the case of disconnection, which makes it possible to determine easily the presence of connection.

[Structure] If a plug 4 is not connected to a jack 17 in at least one of connectors 16, 18, then a discrimination circuit 19 produces an output signal, the disconnection of plug 4 and jack 17 is displayed on a display device 20 and the presence of connection of antennas 1, 6 can be easily determined.

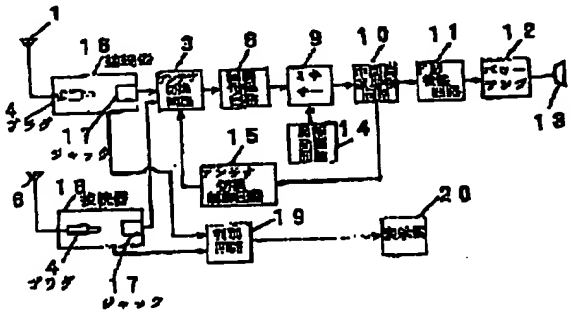


Fig 1
1 – first antenna
3 – antenna switching circuit
4 – plug
6 – second antenna
8 – synchronous amplification circuit
9 – mixer
10 – intermediate frequency amplification circuit
11 – FM detection circuit
12 – power amplifier
14 – local oscillator
15 – antenna switching control circuit
16 – connector
18 – connector
19 – discrimination circuit
20 - display

[Patent Claims]

[Claim 1] A receiver comprising antenna connection means which connects an antenna to a reception circuit, connection detection means detecting the presence of connection provided by said antenna connection means, and output means outputting the results of detection provided by said connection detection means.

[Claim 2] The signal receiver as described in Claim 1, comprising output means producing an alarm signal when a state is detected in which the antenna and reception circuit are not connected by the connection means.

[Claim 3] A signal receiver comprising a plurality of antennas, a plurality of connectors connecting said antennas to antenna switching means, a reception circuit processing signals received by the antenna selected by said antenna switching means, a plurality of connection detection means detecting the presence of connection by said connectors, and output means outputting the results of detection by said plurality of connection detection means.

[Detailed Description of the Invention]

[0001]

[Field of Industrial Application] The present invention relates to receivers such as TV image receivers, FM receivers and AM receivers having an antenna connector connecting an antenna to a reception circuit.

[0002]

[Prior Art Technology] Fig 5 schematically shows a conventional single-tuner FM diversity receiver. In Fig 5, the reference symbol 1 stands for a first antenna and the reference symbol 2 stands for a first connector connecting first antenna 1 to an antenna switching circuit 3. First connector consists of a plug 4 and a jack 5.

[0003] Fig 6 is a detailed view of connector 2. In Fig 6(a), the reference symbol 4 stands for a plug. This plug 4 consists of a central conductor 4b for signal transmission which is connected to a central wire of a coaxial shielded cable 4a connected to antenna 1 and a ground conductor 4c connected to an external shield wire of coaxial shielded cable 4a. Ground conductor 4c is formed from an elastic material. The reference symbol 5 stands for a jack; the jack 5 consists of a central conductor 5a for connection to the central conductor 4b of plug 4 and a cylindrical ground conductor 5b for connection to ground conductor 4c of plug 4. Central conductor 5a is electrically insulated from ground conductor 5b.

[0004] Fig 6 shows a state in which the above-described plug 4 is fit into jack 5. If plug 4 is inserted from one end of jack 5, the central conductor 4b of plug 4 will be in contact with central conductor 5a of jack 5, and the ground conductor 4c of plug 4 will be in contact with the ground conductor 5b of jack 5.

[0005] In Fig 5, the reference symbol 6 stands for a second antenna and the reference symbol 7 stands for a second connector connecting the second antenna 6 to antenna switching circuit 3. The structure of the second connector 7 is identical to that of the above-described connector 2. A signal received by the first antenna 1 or second antenna 6 is selected by antenna switching circuit 3 and supplied to speaker 13 via a synchronous amplification circuit 8, a mixer 9, a intermediate frequency amplification circuit 10, a FM detection circuit 11, and a power amplifier 12. The reference symbol 14 stands for a local oscillator and the reference symbol 15 stands for an antenna switching control circuit. The antenna switching control circuit 15 inputs electric field level signals from intermediate frequency amplification circuit 10, compares the electric field level signal and an integrated signal obtained by integrating the electric field level signal, and outputs an antenna switching signal if the integrated signal has become larger than the electric field level signal. Antenna switching circuit 3 conducts antenna switching when the antenna switching signal is applied thereto.

[0006] The operation of the above-described conventional example will be described below.
The signals received by the first antenna 1 and second antenna 6 shown in Fig 5 are input into the antenna switching circuit 3 via respective connectors 2 and 7. The desired frequency component of the received signal of the first antenna side 1 or the received signal of the second antenna side which was selected by the antenna switching circuit 3 is input into mixer 9 upon discrimination and amplification in the synchronous amplification circuit 8. Mixer 9

mixes the desired frequency component and the oscillation output from the local oscillator 14 and outputs an intermediate frequency signal. The intermediate frequency signal is amplified in intermediate frequency amplification circuit 10, detected with FM detection circuit 11 and then amplified with power amplifier 12. The sound signal is output from speaker 13.

[0007] Fig 5 shows a state in which the signal received by the first antenna 1 has been selected by the antenna switching circuit 3. If the electric field level is decreased and an antenna switching signal is output from the antenna switching control circuit 15, then the antenna switching circuit 3 switches from the first antenna 1 to the second antenna 6.

[0008]
[Problems Addressed by the Invention] However, in the above-described conventional FM diversity receiver, for example, when the jack 5 and plug 4 of connector 7 connecting the second antenna 6 and antenna switching circuit 3 are not fit into each other, the antenna switching circuit 3 always selects the first antenna. Therefore, though radio broadcasting signal can be received, since the second antenna 6 is not selected and the device does not operate as diversity receiver, the reception performance cannot be improved.

[0009] It is an object of the present invention to resolve the above-described problems and to provide a receiver in which the disconnection of antenna can be easily detected owing to the installation of an antenna connection detection means which detects the presence of connection between an antenna and a reception circuit.

[0010]
[Means to Resolve the Problems] The present invention provides a receiver comprising antenna connection means which connects an antenna to a reception circuit, connection detection means detecting the presence of connection provided by the antenna connection means, and output means outputting the results of detection provided by the connection detection means.

[0011]
[Operation] Therefore, through the present invention, the presence of connection in a connector connecting an antenna and a reception circuit is detected by detection means and the absence of the connection by the connector is displayed or an alarm signal is output by an output means. As a result, one can easily know whether the connection is made by the connector.

[0012]
[Embodiment] An embodiment of the present invention will be described below with reference to Figs 1 to 4. Fig 1 schematically shows a single-tuner FM diversity receiver of the first embodiment of the present invention. In Fig 1, the components identical to those shown in Fig 5 are assigned with the same symbols. In Fig 1, the reference symbols 16, 18 are connectors connecting respective antennas 1, 6 to antenna switching circuit 3. The plug 4 of the connectors 16, 18 is the same as in the above-described conventional example, but jack 17 has a structure different from that of the conventional example.

[0013] Fig 2 shows a structure of jack 17 used in the embodiment illustrated by Fig 1. In Fig 2, the reference symbol 17a stands for a central conductor which is to be contacted by the central conductor 4b of plug 4, the reference symbols 17b, 17c stand for split ground conductors, and the reference symbol 17d stands for an insulator fixing and supporting ground conductors 17b, 17c. In Fig 2, ground conductors 17b, 17c are in a non-conductive state because of insulator 17d. However, when plug 4 is inserted in jack 17, the split ground conductors 17b, 17c of jack 17 become conductive because of the ground conductor 4c of plug 4.

[0014] Fig 3 shows a circuit which determines whether the plug 4 and jack 17 are fit into each other. In Fig 3, in a state in which the plug 4 has not been inserted into jack 17, the ground conductors 17b, 17c of jack 17 are insulated from each other. However, if plug 4 is inserted into jack 17, the ground conductors 17b, 17c are short circuited by ground conductor 4c of plug 4. As a result, the base potential of transistor 21 decreases below that of the emitter, transistor 21 becomes conductive, and the potential of point *a* increases, as shown in Fig 4. Thus, the circuit shown in Fig 3 makes it possible to determine whether the plug 4 if fit into jack 17 by detecting the potential of point *a*.

[0015] In Fig 1, the reference symbol 19 stands for a discrimination circuit containing the circuit shown in Fig 3. This discrimination circuit 19 produces an output signal when at least one of connectors 16, 18 is in a non-connected state, and display 20 displays the disconnection of the plug and jack. Furthermore an output device other than the display 20, such as an alarm device producing an alarm sound, can be used instead.

[0016] In the present embodiment, an FM diversity receiver using two antennas was explained. However, the number of antennas and connectors can be other than two. Moreover, the same explanation can be conducted with respect to AM receivers and television image receivers.

[0017]
[Effect of the Invention] The present invention, as clearly demonstrated by the above-described embodiment, provides a discrimination circuit, which detects whether an antenna has been connected, is provided between the antenna and the reception circuit. As a result, it can be easily understood whether the antenna is properly connected or disconnected inside the connector connecting the antenna and the reception circuit.

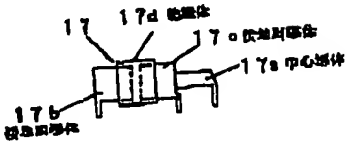
[Brief Description of the Drawings]

[Fig 1] a block diagram of a FM diversity receiver in an embodiment of the present invention
[Fig 2] a side view of a jack of an antenna connector used in the FM diversity receiver in an embodiment of the present invention
[Fig 3] an electric circuit diagram of the connection detection circuit detecting the presence of connection in the antenna connector of the FM diversity receiver in an embodiment of the present invention
[Fig 4] a diagram illustrating the operation of the connection detection circu
[Fig 5] a block diagram of the conventional FM diversity reception device
[Fig 6](a) a side view of the antenna connector used in the conventional FM diversity reception device
[Fig 6](b) a side view illustrating a state in which the plug and jack are connected in the connector of the conventional FM diversity reception device

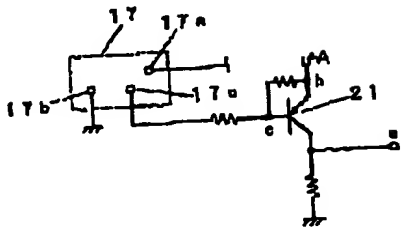
[Legends]

1 – first antenna
3 – antenna switching circuit
4 – plug
6 – second antenna
16, 18 – connector
17 – jack
19 – discrimination circuit
20 – display

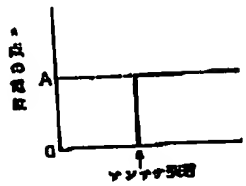
【図2】



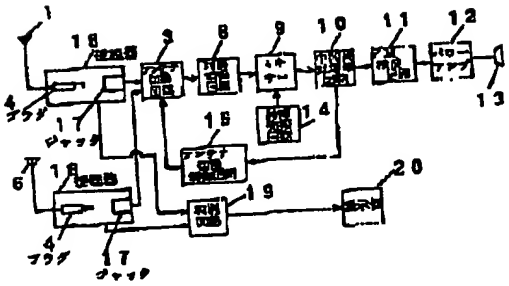
【図3】



【図4】



【図1】



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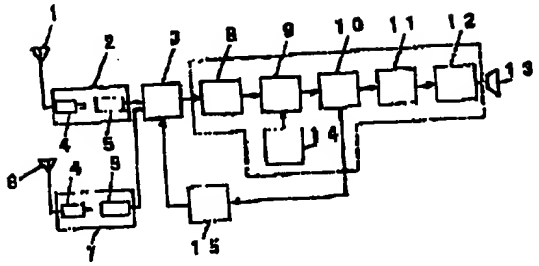
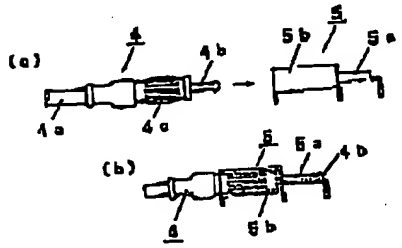


【図6】



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16 – connector
18 – connector
19 – discrimination circuit
20 - display

Fig 2

17a – central conductor
17b – ground conductor
17c – ground conductor
17d – insulator

Fig 4

Ordinate: potential of point *a*
Abscissa: antenna device